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ORNAMENTAL FISH RESOURCES OF MANIPUR: POTENTIALS, PROBLEMS AND STRATEGIES FOR DEVELOPMENT

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ABSTRACT

The study revealed 125 species of fishes in Manipur of which 95 species belonging to 48 genera and 22 families have ornamental value. Fifty percent of these belonged to the family Cyprinidae, 7% to Cobitidae, 5% to Sisoridae 7% to Balitoridae, 3% to Channidae, 8% to Bagridae, 2% each to Chandidae and Mastacembelidae. Species representation in other families (16%) include 1.6% each in Belonidae, Nandidae, Notopteridae, Psilorhynchidae, Schilbeidae and 0.8% each in Amblycipitidae, Anabantidae, Aplocheilidae, Belonidae,Chacidae, Clupeidae, Mugilidae, Symbranchidae, Siluridae and Tetradontidae. The conservation status of fishes showed that 25.6% of them have not been evaluated, 21.6% are vulnerable, 16.0% are endangered and 2.4% are critically endangered. "Low risk near threatened" category amounted to 25.6% and only 6.4% in "low risk least concern" category. Hence a cautious and regulated approach needs to be adopted while promoting ornamental fish trade. Suitable strategies for developing a viable ornamental fish trade in the state are discussed.

Keywords: Ornamental fishes, conservation status, Manipur

INTRODUCTION

Ornamental fishery has grown to a major industry with an annual global turnover of US $ 5 billion and a growth rate of 12%, in which inland fishes constitute 85% of the market share. India's contribution is about US $ 2.7 million to this, although it has a potential to earn US $ 30 million annually (Swain *et al.*, 2003). India has vast aquatic resources, offering good scope for export as well as domestic use of indigenous ornamental fishes. The northeastern region of India has been recognized as a global hot spot of freshwater fish biodiversity (Kottelat and Whitten, 1996). As many as 123 species have potential ornamental value in the northeast alone in which 52

species have international demand, which is about 33.13% of the total Indian freshwater ornamental fishes and share nearly 85% of the freshwater ornamental fish trade (Swain *et al.*, 2003).

Manipur (93° 03' to 94° 78' E longitude and 28° 83' to 25 ° 68' N latitude), is a small state holding a population of 23.3 lakh people in a geographical area of 22327 sq km. Ninety percent of the state is covered by hills, with a small valley of about 2232 sq km in the center. Altitude variations from 790 to 3000 m mean sea level (msl) offer varied environmental conditions in the state. Although information on fish and fisheries of Manipur dates back to the works of Hora (1921), Hora and Mukherji (1935) and Menon (1954), the potential of ornamental fish trade was neglected. This communication briefly outlines the resources, species of ornamental value and their distribution, fisheries potential and problems. Based on these, suitable strategies for sustainable development of ornamental fishery and trade in the state are discussed.

MATERIAL AND METHODS

Collections were made from different water bodies in Manipur, along with observations in fishing areas and markets. Published literatures on the subject (Day, 1978; Ghosh and Lipton, 1982; Sen, 1985; Talwar and Jhingran, 1991; Agarwala, 1994; Nath and Dey, 1997; Viswanath *et al.*, 1998; Sarkar and Ponniah, 2000; Gurumayum and Goswami, 2002) were consulted for compilation of species and their distribution. The ornamental categorization of the fishes was based on colour, shape, size, banding and as described by Dey (1996). Report of the CAMP (1998) was followed to assign the conservation status to the fishes.

RESULTS AND DISCISSION

The two major river systems in the state, with an estimated total length of 2000 km, are the Chindwin-Irrawady in the east, with tributaries *viz.*, Irong, Leimatak, Maklang and Makaru passing through the hills and the Barak-Brahmaputra in the west, with tributaries *viz.*, Imphal, Nambul, Kongba, Iril and Thoubal. Loktak lake cover an area of 28000 ha. Manipur valley has about 21000 ha of floodplains harbouring wide varieties of fishes. The *beels* such as Pumlenpat cover an estimated area of 3500 ha while Kharungpat cover 2000 ha, Ikoppat (2000 ha.), Takmu (500 ha.), Withou (270 ha.), Leingangpat (270 ha.), Khullakpat (300 ha.), Sanapat (52 ha.) and Utrapat (41 ha.), besides several swamps, ponds and tanks. Reservoirs in the state cover 10000 ha. Other water bodies include submerged lands (5400 ha), marshes and swamps (11380 ha), ponds and tanks (3220 ha) and 40000 ha of paddy fields (Suresh, 2002). The total area of water resources available in the state is estimated to be above one lakh ha. All these water bodies harbor

fishes of ornamental value. The detailed break up of water bodies that are available for exploitation of ornamental fishes are shown in Table 1.

The data revealed the presence of 125 species of fishes in Manipur. Of this 95

Table 1: Water bodies and their area in Manipur

Water body	Area (ha)
Lake	19100
Beels/marshes/swamps	11536
Ponds/tanks	9939
River/streams/canals	13888
Reservoirs	10000
Paddy fields	40000
Total	104463

species belonging to 48 genera and 22 families have ornamental value. Fifty percent of these belonged to the family Cyprinidae, 7% to Cobitidae, 5% to Sisoridae 7% to Balitoridae, 3% to Channidae, 8% to Bagridae, 2% each to Chandidae and Mastacembelidae (Fig.1). Species representation in other families (16%) include 1.6% each in Belonidae, Nandidae, Notopteridae, Psilorhyn-chidae, Schilbeidae and 0.8% each in Amblycipitidae, Anabantidae, Aploche-ilidae, Belonidae, Chacidae, Clupeidae, Mugilidae, Symbranchidae, Siluridae and Tetradontidae. These species were occurring in rivers, lakes, swamps, ponds, *beels* and paddy fields. About 14.7 and 13.7% of these species were recorded from Barak-Brahmaputra and Chindwin-Irrawady drainages respectively. Species found common to these two drainages constituted 11.6%. About 45.3% of the species were recorded from rivers, 18.9% from lake, 8.4% from ponds, 7.4% from *beels* and 4.2% from marshes and swamps. The total number of species, in alphabetical order of

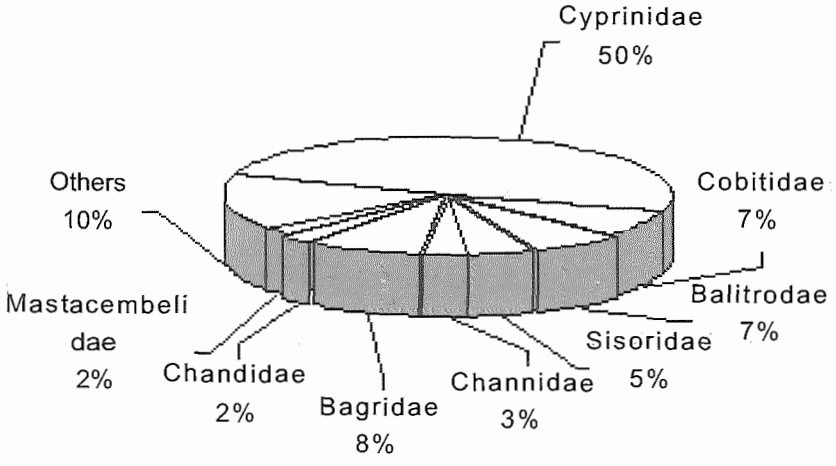

Fig. 1. Percentage representation of ornamental fish species in different families

families, with their conservation status and occurrence are given in Table 2. Intensive explorations in future may add several more species with wider distribution. Earlier 116 species of fishes have been reported from Manipur (Viswanath *et. al.*, 1998) including 12 new species (Vishwanath, 2000). This compilation revealed the existence of 9 more species.

Table 2: Fishes of Manipur, their conservation status and occurrence.

No	Family/Species	Status *	Occurrence
	Amblyciptidae		
1	*Amblyceps mangois* (Hamilton)	LRnt	Barak/Chindwin drainage
	Anabantidae		
2	*Anabas testudineus* (Bloch)	Vu	All water bodies
	Aplocheilidae		
3	*Aplocheilus panchax* (Hamilton)	DD	Lakes, Swamp, Pond
	Bagridae		
4	*Batasio batasio* (Hamilton)	NE	Chindwin
5	*B. tengana* (Hamilton)	NE	Chindwin
6	*Mystus aor* (Hamilton)***	NE	-
7	*M. cavasius* (Hamilton)	LRnt	River
8	*M. tengara* (Hamilton)***	NE	-
9	*M. vittatus* (Bloch)***	Vu	-
10	*Aorichthys bleekeri* (Day)***	Vu	-
11	*A. seenghala* (Sykes)***	NE	-
12	*Ompok bimaculatus* (Bloch)***	EN	-
13	*O. pabda* (Hamilton)***	EN	-
	Balitoridae		
14	*Acanthocobitis zonalternans* (Blyth)	DD	Barak/Chindwin drainage
15	*Balitora brucei* (Gray)	LRnt	Hill stream
16	*Nemacheilus manipurensis* (Chaudhuri)	EN	Barak/Chindwin drainage
17	*N. kangjupkhulensis* Hora	Vu	Chindwin drainage
18	*N. scaturigina* (McClelland)	Vu	Barak
19	*N. sikmaiensis* Hora	EN	Chindwin drainage
20	*Schistura manipurensis* (Chaudhuri)***	EN	-
21	*S. kangjupkhulensis* (Hora)***	Vu	-
22	*S. vinciguerra* (Hora)	EN	Chindwin drainage
	Belonidae		
23	*Xenentodon cancila* (Ham.)	LRnt	River
	Belontidae		
24	*Colisa fasciatus* (Schneider)	LRnt	Pond, Lake, *Beel*
25	*C. sota* (Hamilton)	NE	Pond, Lake, *Beel*
	Chacidae		
26	*Chaca chaca* (Ham.-Buch.)	EN	Jiri river **

Contd..

No	Family/Species	Status *	Occurrence
	Chandidae		
27	*Chanda nama* (Hamilton)	NE	Lake
28	*Pseudambasis ranga* (Ham.-Buch.)	NE	Lake
29	*Pseudambasis baculis* (Ham.)	LRlc	Lake, *Beel*
	Channidae		
30	*Channa marulius* (Schneider)	LRnt	Barak/Chindwin drainage
31	*C. orientalis* (Schneider)	Vu	Lake, River
32	*C. punctata* (Bloch)	LRnt	Swamp, Lake, Pond
33	*C. striatus* (Bloch)	LRnt	Lake, River, Swamp
	Clupeidae		
34	*Gudusia chapra* (Ham.-Buch.)	LRlc	Barak, Jiri river ** system
	Cobitidae		
35	*Botia berdmorei* (Blyth)	EN	Chindwin drainage
36	*B. dario* (Ham.)	NE	Barak drainage
37	*B. histrionica* (Blyth)	Vu	Chindwin drainage
38	*B. rostrata* (Gunther)	NE	Barak/Chindwin drainage
39	*Lepidoceophalus berdmorei* (Blyth)	EN	Barak/Chindwin drainage
40	*L. guntea* (Ham.)	NE	Barak drainage
41	*L. irrorata* (Hora)	Vu	River
42	*Pangio pangio* (Ham.-Buch.)***	Vu	—
43	*Somileptus gongota* (Ham.-Buch.)	LRnt	Jiri river **
	Cyprinidae		
44	*Amblypharyngodon mola* (Hamilton)	LRlc	Lake, River, *Beel*
45	*Aspidoparia morar* (Hamilton)	LRnt	Barak drainage
46	*Barilius barila* (Ham.-Buch.)	Vu	Barak/Chindwin drainage
47	*B. barna* (Hamilton)	LRnt	Barak drainage
48	*B. bendelisis* (Hamilton)	NE	Barak drainage
49	*B. bola* (Hamilton)	Vu	Barak drainage
50	*B. dogarsinghi* (Hora)	EN	Manipur river
51	*B. lairokensis*	EN	Yue river **
52	*B. tileo* (Gray)	LRnt	Barak drainage
53	*B. vagra* (Hamilton)	LRnt	Barak/Chindwin drainage
54	*Bengala elonga* (Hamilton)***	NE	—
55	*Catla catla* (Hamilton)***	Vu	—
56	*Chela laubuca* (Ham.-Buch.)	LRlc	Barak/Chindwin drainage
57	*Cirrhinus mrigala* (Hamilton)***	LRnt	—
58	*C. reba* (Hamilton)***	Vu	—
59	*Conta conta* (Hamilton)***	NE	—
60	*Clupisoma garua* (Hamilton)***	Vu	—
61	*Crossocheilus latius* (Hamilton)***	NE	—
62	*Danio acuticephala* (Hora)	NE	Hill stream
63	*D. aequipinnatus* (McClelland)	LRnt	Hill stream
64	*D. dangila* (Hamilton)	NE	Barak drainage
65	*D. devario* (Hamilton)	LRnt	Barak drainage

Contd..

No	Family/Species	Status *	Occurrence
66	*D. naganensis* (Chaudhuri)	Vu	River
67	*D. yuensis* (Viswanath)	NE	Yue river **
68	*Esomus danricus* (Hamilton)	LRlc	Lake, River, Pond, *Beel*
69	*Garra annandalei* (Hora)***	NE	—
70	*G. gravelyi* (Annandale)***	NE	—
71	*G. gotyla gotyla* (Gray)***	Vu	—
72	*G. lamta* (Hamilton)	Vu	River
73	*G. lissorhynchus* (McClelland)	LRlc	Chindwin drainage
74	*G. litanensis* (Viswanath)	CR	Barak/Chindwin drainage
75	*G. manipurensis* (Viswanath & Sarojnalini)	CR	River
76	*G. naganensis* (Hora)	Vu	Barak drainage
77	*G. nasuta* (McClelland)	NE	River
78	*G. rupecula* (McClelland)	Vu	River
79	*Labeo bata* (Hamilton)***	LRnt	—
80	*L. calbasu* (Hamilton)***	LRnt	—
81	*L. dero* (Hamilton)***	Vu	—
82	*L.gonius* (Hamilton)***	LRnt	—
83	*L. pangusia* (Hamilton)***	LRnt	—
84	*L. rohita* (Hamilton)***	LRnt	—
85	*Neolisocheilus hexagonolepis* (McClelland)***	NE	—
86	*Osteobrama belangeri* (Valenciennes)	CR	Chindwin drauinage
87	*O. cotio cotio* (Hamilton-Buchanan)	LRnt	Lake, River, *Beel*
88	*O. cotio cunma* (Day)***	Vu	—
89	*Poropuntius clavatus*(McClelland)***	EN	—
90	*Puntius chola* (Hamilton)	Vu	Lake, River
91	*P. conchonius* (Hamilton)	Vu	River, Pond, Lake, Marsh
92	*P. sarana orphoides* (Valenciennes)	EN	Chakpi stream
93	*P. phutunio* (Hamilton Buchanan)	LRlc	River, Lake
94	*P. sarana* (Hamilton)	NE	Chindwin drauinage
95	*P. sophore* (Hamilton)***	LRnt	—
96	*P. ticto* (Hamilton)	LRnt	Lake, River, Pond
97	*Parluciosoma daniconius* (Hamilton)	LRnt	Rivers, Paddy fields
98	*Raiamas guttatus* (Day)***	EN	—
99	*Rasbora rasbora* (Hamilton)	LRnt	River
100	*Salmostoma bacaila* (Hamilton)	LRlc	River
101	*Schizothorax richardsonnii* (Gray)	NE	Hill streams
102	*Tor progeneius* (McClelland)	DD	Hil streams
103	*T. putitora* (Hamilton)***	EN	—
104	*T. tor* (Hamilton)***	EN	—
	Siluridae		
105	*Wallago attu* (Schneider)	LRnt	Rivers
	Mastacembelidae		
106	*Mastacembelus armatus* (Lacepedè)	NE	River, Pond, Lake

Contd..

No	Family/Species	Status *	Occurrence
107	*Macrognathus aral* (Bloch)	LRnt	Barak drainage
108	*M. pancalus* (Hamilton)	NE	Barak/Chindwin drainage
	Mugilidae		
109	*Sicamugil cascasia* (Hamilton)***	Vu	—
	Nandidae		
110	*Badis badis* (Ham.-Buch.)	NE	River
111	*Nandus nandus* (Ham.-Buch.)	NE	River
	Notopteridae		
112	*Notopterus notopterus* (Pallas)	LRnt	River, Lake, *Beel*
113	*Chitala chitala* (Pallas)	EN	Barak drainage
	Psilorhynchidae		
114	*Psilorhynchus homaloptera* (Hora & Mukerji)	Vu	Chindwin drauinage 115
	P. sucatio (Hamilton)	EN	Chindwin drauinage
	Schilbeidae		
116	*Pseudeutropius atherinoides* (Bloch)***	EN	—
117	*Erethistes pusillus* (Muller and Troschel)	NE	River
	Sisoridae		
118	*Glyptothorax cavia* (Hamilton)	EN	Hill streams
119	*G. platypogonoides* (Bleeker)	NE	Hill streams
120	*G. striatus* (McClelland)	Vu	Hill streams
121	*G. telchitta* (Hamilton)	LRnt	Chindwin hillstreams
122	*G. trilineatus* (Blyth)	NE	River
123	*Hara hara* (Hamilton)	NE	River
	Symbranchidae		
124	*Monopterus cuchia* (Ham.-Buch.)	LRnt	Pond, Stream
	Tetradontidae		
125	*Tetradon cutcutia* Ham.-Buch.	LRnt	Barak drainage

*LRlc- Low risk least concern, LRnt- Low risk near threatened, Vu- Vulnerable, NE- Not evaluated, CR- Critically endangered, EN- Endangered, DD- Data deficient, *(CAMP, 1998), **Gurumayum and Goswami, 2002), *** Sarkar and Ponniah (2000).*

In general the indigenous freshwater ornamental fishes from India have good potential for the export and domestic markets. With about 85% of the country's export constitute species from the northeastern states (Swain *et al.*, 2003), mostly caught from the wild; the wide ornamental fish spectrum in Manipur appears to hold good opportunities. The accessibility to Kolkata, which has been the largest exit point for indigenous ornamental fishes (90%) in the country (Sahu and Mohanty, 2000), developing serious ornamental fish trade from Manipur seems practical and easy. The status of ornamental fish species in the state, however, does not seem to support this. The major impediment is the lack of information on their resource size in the wild. A perusal of the conservation status of fishes (CAMP, 1998) in the

state revealed that 25.6% have not been evaluated, 21.6% are vulnerable, 16.0% are endangered and 2.4% are critically endangered. "Low risk near threatened" category amounted to 25.6% and only 6.4% in "low risk least concern" category. Data deficient (DD) category formed 2.4% of the species (Fig. 2).

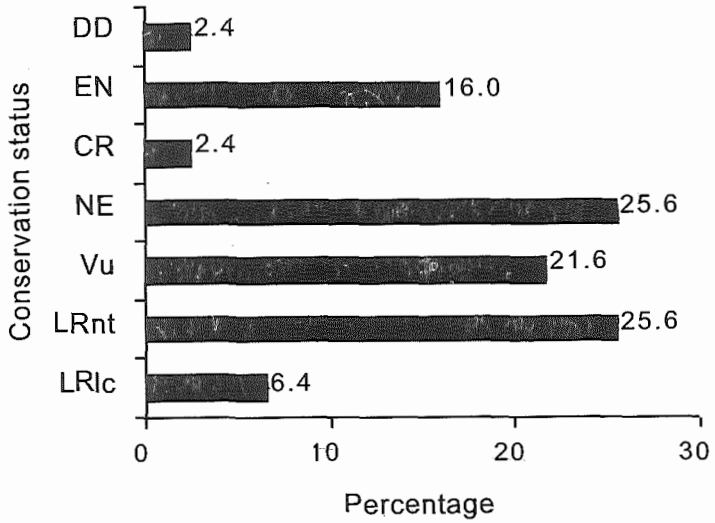

Fig. 2. Ornamental fish species included in different conservation categories (LRlc-low risk least concern, LRnt-low risk near threatened, CR-critically endangered, EN-endangered, Vu-vulnerable, DD-data deficient, NE-not evaluated)

The IUCN Red Data Book listed 34 ornamental species, which include *Osteobrama belangeri*, *Garra manipurensis* (endemic to Manipur and critically endangered); *Botia berdmorei, Lepidocephalus berdmorei*, *Puntius sarana orphoides* (endangered) and *Anabas testudineus, Channa orientalis* (vulnerable). However exclusive studies to determine the conservation status of these fishes in Manipur is yet to be made. Although there is no organized ornamental fish trade from Manipur, there has been transport of several species, caught from the wild, by traders. There were also reports on clandestine export of rare fish species from the state (Suresh, 2000). Any fish is attractive to the palate of Manipuries. Most of the ornamental fishes are also considered as important food fishes in the state and are being indiscriminately exploited. In these circumstances launching ornamental fish trade in Manipur would only encourage wild collections, which may invite unforeseen consequences. Hence a cautious and carefully regulated approach needs to be followed in promoting trade. More than 30 species are presently being traded from the northeast; however no clear assessment of the quantity or species involved is available.

In Manipur, considerable work has been carried out on taxonomy and cataloguing. However, there has not

been any effort on resource assessment, captive breeding and propagation, keeping the upcoming avenues in ornamental fish trade. Although NABARD has come up with schemes for entrepreneurship in this line, the level of awareness among the people, especially the fishers and traders, is poor. Nevertheless, ample potential lies in promoting some of the high value species through captive breeding and species-specific collections for those listed in the LRlc category with strict monitoring.

Now that the MPEDA, Guwahati, oriented to develop ornamental fish export opportunities from the Northeast, Manipur need to capitalize this. Research Institutes, Universities and MPEDA can bring the necessary technology needed for captive breeding and propagation of these fishes, while the Indian Institute of Entrepreneurship Development at Guwahati, with the active co-operation from research institutions and state fisheries departments, can address the entrepreneurship development issues in this sector in the state and immediately attempt to assess the resources, evaluate species for conservation status, along with working out species specific fishable limits for judicious collection from the wild. The existing traders and collectors in Manipur need to be identified and registered for regulation and monitoring. Studies on the ecology, biology, natural requirements, feeding and breeding behavior, maintenance, artificial feeds and feed formulations also need to be initiated in Manipur along with education and training for the local entrepreneurs and fishers.

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